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The Impact of Peer Social Status on Social Interactions and Achievement in Small Learning Groups for Mathematics

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ABSTRACT

This research study investigated the impact of peer social status on first graders' social interactions and the construction of mathematical concepts during small group collaboration for mathematics under two conditions: when the groups were composed of students with equal social status and when the groups were composed of students with diverse social status.

The research took place in a first grade urban classroom with 16 students in Western New York. The researcher, as an objective observer, studied all students during Investigations activities. In addition, three different focus groups were observed: a high social status group, a low social status group, and a diverse social status group.

This study found that the types of groupings students are involved in have a noticeable affect on social interaction and achievement. When students are grouped with classmates of approximately equal social status, they interact more freely and positively and achieve a clear understanding of the mathematical concept or task. When students are members of a group composed of students with diverse social status, social interactions tend to be inhibited, especially for students of lower-range social status, and students do not gain as much from the experience as their peers in equal status groupings do.

The findings in this study imply the importance of considering peer social status when grouping students for activities in the classroom.

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Chapter 1

INTRODUCTION

According to recent research, little contribution is expected from students of low classroom social status when working in small learning groups, while high levels of contribution are expected of high social status students. During the group process, higher social status students take on the role of leaders in their groups and these students' ideas are often reflected in the finished group products (Matthews and Kesner, 2003). When students of low social status do contribute to the group process, their ideas are often rejected or ignored. Therefore, low status students share their ideas and participate less than high status students. Because they participate less in the learning activities, students of lower status learn less from the activity than the high status students who are more involved and, as a result, do not perform as well as high status students do (Cohen et al., 1999). This study will examine the impact of peer status on first graders' achievement and social interactions within small learning groups.

Research Question

How does peer status impact first graders' construction of mathematical concepts and social interaction skills within small learning groups under two conditions: (1) when groups are composed of students with equal social status, as determined by a sociogram and, (2) when groups are composed of students with diverse social status?

Background

The research that follows was conducted during the 2006-2007 school year in a large urban school district. The researcher was a graduate student completing a master's degree in childhood education. The study took place in a first grade general education classroom where the researcher taught 15 hours per week as a yearlong intern under a mentor teacher. The classroom included sixteen students, five boys and eleven girls. The classroom diversity statistics were as follows: ten African American, five Hispanic, and one Caucasian. The urban school and surrounding community are comprised mostly of families of low socio-economic status.

This topic was meaningful for the researcher because students in the classroom where the study was completed were frequently grouped for academic tasks, particularly in mathematics. If students are to be successful, it seemed essential to establish learning groups and arrange students so that every child's ideas are valued, accepted, and respected.

Limitations of the Study

The findings from this study are limited to one first grade classroom and cannot be generalized to other first grade classrooms. The sample size of sixteen students is too small to generalize to other first grade learning groups. Furthermore, outside factors such as gender, race, academic status, and socio-economic status may impact the findings expressed here. The extent to which peer social status is solely

responsible for achievement and social behaviors within the learning groups is immeasurable. Therefore, the results of this study should not be generalized to all first grade learning groups.

Definitions

Peer social status: In this study, peer social status is an identification of the extent to which a student is accepted or rejected by peers (Hubbard and Power, 2003).

Investigations: Investigations is a K-5 mathematics curriculum that allows for students to work in a variety of groupings such as a whole class, individually, in pairs, and in small groups to explore mathematics and express their mathematical thinking through drawing, writing, and talking with others.

Sociogram: For the purposes of this study, a sociogram is a tool that uses student interviews with each member of the class and requires students to identify classmates with whom they would most like to play (adapted from Hubbard and Power, 2003).

Social interaction skills: In this study, the social interaction skills referred to include communicating ideas orally, active/passive listening, encouraging other group members to participate, showing respect for one another and one another's ideas, appropriately sharing materials necessary for completing a given task, and asking for help as needed.

Small learning groups: For this particular study, small learning groups are groups of two to three students who work together to complete an investigation or task.

Chapter 2

REVIEW OF THE LITERATURE

Introduction

Current research reveals that there is a significant relationship between peer social relationships and children's academic achievement. Children who are well liked and accepted by their peers tend to perform better in academic and social situations than students who are not well liked or accepted by their peers. According to current research, it is beneficial to consider classroom social status when grouping students for classroom activities, such as those in Investigations, a K-5 mathematics curriculum. The studies reviewed in this chapter suggest that if students are to be successful, it is essential to establish learning groups that foster positive social interactions and a learning environment in which every child's ideas are valued, accepted, and respected. This is an intriguing topic that warrants further consideration. How does peer social status impact achievement and interactions in small learning groups?

Social Constructivist Theory

According to the theory of social constructivism, learning occurs within a sociocultural context. Social constructivism, also at times referred to as Vygotskian constructivism, suggests that individual development is a product of social interactions and shared experiences with others (Von Glasersfeld, 1996; Wentzel and

Watkins, 2002). This perspective can be contrasted with a more traditional approach to mathematics associated with certainty, with knowing how to get and arriving at the right answer. This type of instruction is teacher-centered and presumes that students are sponges who will absorb the information presented to them. In more recent years the reformed classroom, grounded in social constructivist theory, offers a more student-centered approach to learning.

More and more teachers are taking on a new perspective of mathematics, in which less focus is on getting the correct answer and more emphasis is given to higher level thinking skills and processes (Lambert, 1990). Some teachers have even come to see student errors as productive wrong ideas that help students to achieve a greater breadth and depth of understanding (Duckworth, 1996). Within the context of the reformed classroom, teachers have gone to the extent of organizing lessons in a way that encourages students to think and practice as mathematicians do, by making conjectures, examining assumptions, posing questions, explaining and justifying their reasoning, and reflecting on their thinking and that of others (Lambert, 1990). While working with peers in this way, children develop cognitively as their current understandings of the world are challenged by contradictory viewpoints and ideas (Piaget, 1926). A conscious awareness of this cognitive conflict causes an individual to enter a state of disequilibration, whereby the individual must reorganize and reconceptualize information to reach a resolution and achieve higher levels of understanding (Almasi, 1995). It is this idea of how mathematics is done and

understood by the learner that underscores the particular importance of collaboration to mathematical understanding and concept development.

The Importance of Small-Group Learning in the Social Constructivist Classroom

Within the social constructivist framework, small-group learning is credited as positively affecting student achievement and social interactions (Leonard, 2001; Lou et al., 1996; Wentzel and Watkins, 2002). Opportunities for collaborative learning within the classroom promote active cognitive involvement and higher level thinking skills as students work through and rework math problems, discuss possibilities and share ideas, provide elaborate explanations for and justify their answers and solutions.

Small group learning has many benefits. Small group learning emphasizes diversity, as opposed to uniformity, of instruction (Leonard, 2001; Lou et al., 1996). It allows students to act as peer coaches and tutors to promote others' as well as their own learning. Small-group learning also enables teachers to adapt objectives and assignments to address students' interests and needs and offers more flexibility in pacing. Most importantly, small groups are advantageous because they promote student involvement, motivation, and participation (Wentzel and Watkins, 2002). Students are not only more likely to be actively engaged in the group process, but also more likely to ask questions and request assistance when needed (Leonard, 2001). Linchevski and Kutscher (1998) found that students who experience and resolve misconceptions and cognitive conflicts while working with peers acquire more knowledge than students that do not have the opportunity to do so.

Collaborative learning activities provide meaningful learning experiences for all students that the traditional teacher-centered classroom simply cannot provide (Cobb, Yackel and Wood, 2006). In response to evidence signifying the social and academic benefits of collaboration in education, many teachers have taken initiative to establish learning environments that allow for increased social interactions between group members in their classrooms (Matthews and Kesner, 2003). Evidence has also been presented, however, that suggests that group composition is one of many factors that can affect student achievement in collaborative learning groups. Some factors that are typically considered when examining group composition include, but are not limited to, ability and gender.

Ability Grouping: Achievement in Heterogeneous and Homogeneous Groups

In the past, many of the studies pertaining to learning groups have focused on heterogeneous and homogeneous composition based on student ability. Heterogeneous learning groups are those that include students of mixed abilities, while homogeneous groups are composed of students with approximately the same level of ability. Traditionally, ability grouping has been viewed as a way of attending to diverse student needs by providing teachers with the opportunity to adjust and modify, or differentiate, instruction (Lou et al., 1996; Wentzel and Watkins, 2002).

Currently, there are varying opinions regarding the effectiveness and usefulness of heterogeneous and homogeneous groupings. Generally, those in favor of ability grouping believe that such organization of the classroom allows for teachers

to attend to students' diverse instructional needs by adapting and modifying materials, processes, outcomes, and level and pace of instruction for the various groups (Leonard, 2001; Linchevski and Kutscher, 1998; Lou et al., 1996). They believe that homogeneous groups allow for slower learning students to learn at their own pace while allowing faster learning students to continue moving forward, maintaining interest and motivation. In addition, many believe that students who learn more slowly are more comfortable in homogeneous learning groups and participate more frequently within them (Leonard, 2001; Wentzel and Watkins, 2001; Whitburn, 2001).

Those in favor of heterogeneous groupings argue that same ability groups may discriminate against students from ethnic minority and lower socioeconomic status groups and often deprive lower achieving students from opportunities to learn from their higher achieving peers (Donelgan, Neal and Jones, 1994; Linchevski and Kutscher, 1998; Whitburn, 2001). In addition, lower achieving groups may not receive the rigorous, high quality instruction that higher achieving students receive in homogeneous groupings. Furthermore, once composed, it is often difficult to move between the various groups (Whitburn, 2001).

Research regarding ability grouping, has revealed a range of findings related to the effectiveness and usefulness of ability grouping for high, average, and low achieving students (Linchevski and Kutscher, 1998; Lou et al., 1996). Some researchers believe that heterogeneous learning groups are detrimental to student achievement. For example, one study of primary and high school mathematics

students placed in mixed ability groups revealed that curriculum polarization, whereby students are given tasks that are not matched to their levels of ability, hinders academic development (Boaler, Wiliam and Brown, 2001). The researchers in this study discovered that mixed grouping "creates a set of expectations for teachers that overrides their awareness of individual capabilities" (Boaler, Wiliam and Brown, 2001, p. 641) In addition, the majority of students in these mixed settings describe their lessons in mathematics as being redundant or repetitive, and their involvement in those lessons to be extremely limited. This study further suggests that lower levels of achievement internationally may be a result of curriculum polarization and a mere lack of meaningful opportunities for learning resulting from heterogeneous groups within classrooms.

Other studies suggest that heterogeneous learning groups are beneficial, rather than detrimental, under certain conditions. Many studies suggest that lower and average ability students, in particular, benefit from heterogeneous groups if they have access to peers who may be more knowledgeable of the content being studied (Leonard, 2001; Linchevski and Kutscher, 1998; Webb et al., 1998; Wentzel and Watkins, 2002). In heterogeneous groups, lower achieving students benefit from the well-reasoned explanations high achievers are able to provide.

Still other studies suggest that heterogeneous learning activities are beneficial to all students, regardless of the type of activity being completed (Fuchs et al., 1998; Whitburn, 2001). Fuchs et al. (1998) found that small heterogeneous learning groups promote respect, responsibility, and high achievement. In addition, students

demonstrate higher level thinking skills, more positive social interactions, and more frequent helping behaviors when they participate in heterogeneous as opposed to homogeneous learning groups.

Though some worry that heterogeneous groupings hold back high-ability students, others have documented that such groups actually benefit those students more because of the teacher roles they assume while working with others. Providing explanations to peers promotes reorganization and reconceptualization of information, ultimately resulting in a greater depth and breadth of understanding (Webb, Baxter and Thompson, 1997). Furthermore, higher achieving students benefit from opportunities to construct their own learning experiences (Fuchs et al., 1998).

Those opposed to mixed ability groups believe that homogeneous learning groups are more beneficial for students, especially higher achieving students. For example, one study from the past has determined that higher ability students do achieve more in homogeneous groups than in heterogeneous groups, but nonetheless, do not suffer any negative consequences when placed in mixed groups (Webb et al., 1998). Webb (1991) concluded that homogenous groups are more beneficial to average ability students as well, as they tend to participate more in social interactions and group process and, ultimately, achieve more because of it (Webb, 1991)

Some researchers believe that homogeneous learning groups are more effective than heterogeneous groups under certain, prescribed conditions. For instance, Fuchs et al. (1998) found that high achieving students perform better and experience greater levels of cognitive development in homogenous learning groups

when working only on complex tasks. They contribute this to extensive opportunities for high achievers to participate in collaborative thinking and experience cognitive conflict and resolution that are present in the homogeneous groups. When working on simpler tasks, however, they discovered that mixed ability groupings were more effective. This study suggests that it is useful for teachers to consider the activity students will be completing when determining whether heterogeneous or homogeneous groups will be more effective for instructional purposes (Fuchs et al., 1998).

The variance of results relating to heterogeneous and homogeneous learning groups demonstrates the need to consider variables other than ability when examining learning groups within the classroom. Gender and peer social status are factors that may be examined when constructing learning groups for instructional purposes.

Examining Gender and Achievement

Many studies suggest that the impact of gender is insignificant or nonexistent (Manger and Gjestad, 1997; Webb, 1984; Webb and Kenderski, 1985). One Norwegian study involving third graders, 440 girls and 480 boys, examined the relationship between the ratio of girls to boys within the classroom and achievement. Based on their study, Manger and Gjestad (1997) concluded that belonging to a class in which boys outnumbered the girls or vice versa did not have a significant affect upon either social interactions within groups or achievement. These studies seem to

suggest that gender does not impact achievement or social interactions in learning groups at the elementary level.

Not all mixed-gender groupings function in the same way, however, and many studies suggest that gender influences group interaction and achievement, with boys tending to dominate social interactions occurring in mixed-gender groups (Lockheed and Harris, 1984; Webb, Baxter and Thompson, 1997). Similarly, Webb (1984) found that girls tended to participate and achieve less in mixed-gender groups with unequal numbers of males and females. He discovered that females performed as well as males only in groups with equal ratios of males to females. Leahey and Guo (2001) argue that gender differences are prevalent, but do not appear until the secondary level of schooling. At approximately the tenth grade, it becomes apparent that boys accelerate in general mathematics faster than girls do, particularly in the areas of mathematical reasoning and geometry. Although the differences are slight, they are nonetheless significant (Leahey and Guo, 2001).

When in small groups for collaborative activities, Strough and Berg (2000) found that social interactions, in particular, differ based on gender composition. According to their study, when preadolescent girls work collaboratively with same-gender peers, they are generally more focused upon mutual participation goals and are more likely to use high-affiliation conversation strategies than are boys (Strough and Berg, 2000). On the contrary, Leonard's (2001) study of 177 sixth grade students concluded that African American males performed better when working collaboratively than African American females did. However, when groups were

homogeneous in gender but not in race, African American students achieved significantly less than in same gender and race groups. In these groups, the African American students were often ignored, while the Caucasian students assumed all responsibility for completing the task (Leonard, 2001). These studies suggest that gender does impact social interactions and achievement within small learning groups, even at the elementary level. However, the impact of gender may be confounded by other factors, such as race.

Peer Social Status and Achievement in Small Learning Groups

Research suggests that peer status is strongly related to student achievement in small learning groups (Matthews and Kesner, 2003). Peer status is an identification of the extent to which a student is accepted or rejected by peers. Peer status can be identified using a sociogram, a tool that uses student interviews with each member of the class and requires students to identify classmates with whom they would most like to work or play. A high status student, sometimes referred to as a star, is well-liked by his/her peers and identified frequently as a student others desire to work or play with. Students of low status are much less frequently identified as students others desire to work and play with and experience lower levels of peer acceptance (Hubbard and Power, 2003). Within the context of the learning group, little contribution is expected from low-status students, while high levels of contribution are expected of high-status students. During the group process, higher status students take on the role of leaders among their group members and these students' ideas are

often reflected in the finished group products (Matthews and Kesner, 2003). This is because any responses given by high-status students are evaluated as being correct by fellow group members, while lower social status students' contributions are not usually perceived as correct (Chiu, 2000).

This sets up a self-fulfilling prophecy. When low-status students contribute to the group process, their ideas are often rejected or ignored. Therefore, low-status students share their ideas and participate less than high-status students. Students of higher social status maintain on-task for the duration of activities and their participation in positive social interactions lead to popularity. Students of lower social status are less on task and infrequently engage in positive social interactions. Because they participate less in the learning activities, students of lower status learn less from the activity than the high-status students who are highly involved and, as a result, do not perform as well as high-status students do (Cohen et al.,1999).

Long-Range Impact of Peer Social Status

Not only is achievement impacted by peer status, but there is some evidence that experiencing low acceptance from peers during childhood poses later risks of educational under-achievement and unemployment by the age of 18 years. Children with substantial early peer relationship problems, in conjunction with other factors such as IQ, attention difficulties, and social backgrounds, experience a higher risk of under-achievement and unemployment than their peers who have significantly lower rates of early peer relationship problems (Woodward and Fergusson, 2000).

Furthermore, childhood peer relationship problems appear to result in a range of interpersonal and school-related difficulties, which include weak peer attachments, interpersonal conflicts with teachers, absenteeism, school suspension, and increased drop-our rates (Wentzel and Caldwell, 1997). As a result, behaviors and outcomes related to peer relationship problems reduce opportunities for achievement and gainful employment.

Peer relationship problems can also negatively impact social and emotional well-being. Chronic and proximal peer rejection results in significantly higher levels of externalizing behaviors as well as internalizing behaviors, such as anxiety and shyness (DeRosier, Kupersmidt and Patterson, 1994).

Although peer relationships can have a significant impact upon social behaviors and achievement, teachers can help to reduce the negative consequences of peer rejection or relationship problems. A child's adjustment at school can be positively impacted if the child is liked by the teacher. Wentzel and Watkins (1995) suggest that having a positive relationship with the classroom teacher has more of an impact upon a student's achievement, progress, and behavior than peer relationships do. In addition, teachers can help to improve peer social relationships by providing positive feedback to students in the presence of their peers, otherwise known as public praise, and assigning competence to the student (Boaler, 2006; Wentzel and Watkins, 2002).

Within small learning groups, teachers can foster positive social relationships by facilitating discussions about appropriate social interaction and behaviors, as well

as by providing students with specific member roles (Lotan, 2006). Fostering positive interactions and achievement in mathematics is of particular importance based upon the need to improve overall student performance in mathematics.

Student Performance in Mathematics

Student performance in mathematics continues to be a central focus in education as mathematical competency creates opportunities to engage in higher education and economic advancement. According to New York State Education Department's recent publications regarding overall student performance on the standardized mathematics tests for grades three through eight, there are substantial differences in student performance among large city, average needs, and low needs districts (University of the State of New York State Education Department, 2006).

Specifically, results reveal that overall student achievement in Grades 3-8 ranges from about 35 percent of students meeting all the standards in the Big Four Cities, which include Buffalo, Rochester, Syracuse, and Yonkers, to about 74 percent in average need districts, to 86 percent in low need districts. Furthermore, large city districts typically house populations of students that are generally underrepresented in mathematics, including African-Americans, Hispanics/Latinos, Native Americans, Alaskan Natives, Pacific Islanders, females, children in poor communities, children with disabilities, Asian Americans, and others.

Historically, students from underrepresented groups choose to take advanced mathematics courses and enter into vocations and careers related to mathematics less

frequently than students from groups that are typically well represented. Many believe that underrepresented students are even discouraged from taking advanced mathematics courses and because of this, opportunities for higher education and employment opportunities are often limited for underrepresented groups. It is imperative that such trends are reversed by providing structure and support for all students that will lead to a larger, more diverse pool of students with strong mathematical foundations. Such changes will ultimately narrow the achievement gap and increase the presence of underrepresented groups in a wider range of careers, including mathematics education, engineering, and science related fields (National Council of Teachers of Mathematics, 2007).

In their efforts to narrow the achievement gap, teachers must examine not only socioeconomic status and race, but also other classroom variables that may have an impact upon learning and achievement (Leonard, 2001). One such variable that warrants examination is small-group composition within the classroom.

Why Considering Classroom Social Status is Important

It is highly important to consider how groups are composed within our own classrooms. Current research reveals that if students are to achieve in the learning groups we establish, we must be sure that students are arranged in groups in which their ideas will be accepted and respected (Cohen et. al., 1999). Based on the theory of social constructivism, it is known that students learn from interacting with others. However, it is likely that certain types of learning groups will allow for increased

positive social interactions and participation among group members. This research seeks to identify, from a teacher's perspective, which types of learning groups, based on peer status, are most effective and useful within the classroom so that the achievement gap that exists may be diminished as all students reach high levels of acceptance and success. Considering the limited research on the effects that group composition has on group dynamics and learning, this study is an attempt to uncover the ways in which grouping students according to peer social status can be used to foster positive social interactions, maximize learning potential in mathematics, and narrow the achievement gap.

Summary

Research reveals that it is advantageous to organize students into small groups for instruction as opposed to using whole-group instruction. Furthermore, research shows a significant effect on within-class grouping when students are arranged into groups based on factors other than ability alone. Peer status is one of the factors that should be considered when students are organized for collaborative learning activities in small groups.

Chapter 3

METHODOLOGY

Introduction

This study was designed to examine the impact of peer status on first graders' achievement and social interactions within small learning groups. According to research, peer status is one of the factors that should be considered when students are organized for collaborative learning activities in small groups. Students in small learning groups tend to perform significantly better when groups are organized based on factors other than ability alone.

Research Questions

How does peer status impact first graders' construction of mathematical concepts and social interaction skills within small learning groups under two conditions: (1) when groups are composed of students with equal social status, as determined by a sociogram and, (2) when groups are composed of students with diverse social status?

Subjects

The research took place in a first grade urban classroom setting in Western New York. The classroom consisted of 16 students. Although all students participated in the small group activities for mathematics, data was only collected on a focus group of eight students. These students were selected based on the fact that parental informed consent was not obtained for the remaining students in the classroom. (See Attachment E in the appendix for a copy of the informed consent

letter to parents.) The focus group consisted of two boys and six girls. Five of the subjects were African American, two were Hispanic, and one was Caucasian. Generally, students of lower social status were of lower ability, students of mid-range social status demonstrated average ability, and students of higher social status showed a higher level of ability and achievement. Two exceptions were noted. Two students, both of lower social status, demonstrated high ability. All subjects qualified for free lunch.

Grouping of Subjects

Prior to arranging students into groups, the researcher conducted a sociogram (adapted from Hubbard and Power, 2003) to determine each student's peer social status rating. (Refer to Attachment A in the appendix.) Based on the results of the sociogram, three of the eight subjects were identified as having high peer social status, two as mid-range social status, and three as low-range social status. Students were then arranged into groups based upon social status. This study examined the construction of mathematical concepts and social interactions occurring in groups composed of students of equal social status and groups including students of varied social status.

Data Collection and Instruments

During the first two weeks of data collection, the researcher focused upon one group of three students which consisted of equal high social status students. For the next two weeks of data collection, the researcher focused upon one group of three students composed of equal low-range social status students. For the remaining two

weeks of data collection, the researcher observed a group of diverse social status students that included one low-range, one mid-range, and one high social status student.

During each phase of data collection, the focus group was observed while working collaboratively to complete a mathematical task for a period of thirty to forty minutes per day, four days a week. As the students collaborated, the researcher used checklists and field notes to identify and record student behaviors and student interactions from an objective standpoint. The checklist has been designed by the researcher as a means to identify whether or not the students in each group are: on task; sharing ideas/explaining concepts; listening to other members of their group; encouraging others to participate, showing respect for one another and one another's ideas; sharing materials needed to complete the task; and asking questions/asking other group members for help. (Refer to Attachment B in the appendix.)

Collective group work produced during periods of collaboration was collected and analyzed using a checklist for group work that examines student responses, problem-solving strategies, and member contribution. Specifically, the researcher designed the checklist as a way to determine if the group's response is correct, practical, and a product of the whole group as opposed to an individual or individuals. (Refer to Attachment C in the appendix.)

To supplement these observations and analyses, the researcher conducted student interviews. Each focus group member was questioned at the end of both weeks of data collection as a means of examining student attitudes and feelings

regarding their work in collaborative groups. The interview questions are as follows: Did you like working in your group this week? Why or why not? Do you think that working in your group helped you to learn? If yes, how did it help you?

In addition, any individual student work completed after group collaboration was collected and analyzed using a checklist for individual work that examines the student's response and problem-solving strategy and attempts to uncover similarities in individual work among group members. (Refer to Attachment D in the appendix.)

A researcher's journal was kept as a means of describing progress in the data collection and analysis phases and personal reflections with respect to those components of the project.

In addition to these assessments of individual and group work, the researcher took field notes during the school day as a way of recording observations that were considered to be of importance. For example, the researcher made note of any situations or factors that may have potentially influenced students' individual or collaborative work. The researcher also observed the whole class as they worked in pairs for Investigations activities.

To ensure confidentiality of data, pseudonyms were assigned to each child prior to the commencement of the research. All data was contained in a locked filing cabinet in the researcher's home. Furthermore, no information about social status based on the sociogram analysis was shared with students.

The following table shows the triangulation of data.

Table 1

Focus/ Question	**Data Source #1**	**Data Source #2**	**Data Source #3**
Student Achievement In Small Learning Groups	Observation Checklist (Attachment C)	Student interviews (random)	Checklist for assessing student work – both individual and group work
Student Social Interactions in Small Learning Groups	Observation Checklist	Student interviews	Field notes and researcher's journal
Student Classroom Social Status	Sociogram	Student interviews	Field notes and researcher's journal

Review of the Data

To analyze the data, the researcher examined the observation checklists completed for each individual focus group, first examining each single observation and then all observations as a cohesive whole, looking for trends and patterns regarding time on task, student social interactions, and participation of group members. After trends and patterns were recorded for individual focus groups, the data from each group was compared to data from the other two groups. This same procedure was used to analyze data collected using the individual and group work assessment checklists, as well as for the student interviews.

To supplement those techniques for data analysis described above, the researcher closely examined her field notes to determine whether or not the observations and assumptions derived from her field notes supported the data collected during group collaboration. Taking into consideration the information collected under each of the various modes of data collection, the researcher made generalizations regarding the usefulness and effectiveness of each type of small learning group with respect to group composition.

The degree of usefulness and effectiveness of each type of small learning group with respect to group composition may or may not be consistent with those for another similarly structured classroom of first-grade students. The data described in this study is valid and reliable for one first-grade classroom in an urban elementary school setting. However, the findings expressed here cannot and should not be generalized to other first-grade students and groups.

Chapter 4

FINDINGS

Introduction

This study examined the impact of peer social status on first graders' achievement and social interactions within small learning groups. The research was completed in a first grade general education classroom in an urban setting. The researcher, as an objective observer, studied all students during Investigations activities. In addition, she observed three different focus groups: a high social status group, a low social status group, and a diverse social status group. Focus groups were composed of students for whom informed consent was obtained.

Research Questions

How does peer status impact first graders' construction of mathematical concepts and social interaction skills within small learning groups under two conditions: (1) when groups are composed of students with equal social status, as determined by a sociogram and, (2) when groups are composed of students with diverse social status?

The triangulation Table 1 on page 23 identifies the instruments used to examine each of the preceding research questions.

Research Results

How does peer status impact first graders' construction of mathematical concepts and social interactions in small learning groups when groups are composed of students with equal social status?

Generalization # 1

Based on the results of this study, students in equal social status groupings are more often on task compared to their peers in diverse status groupings. They remain on task for the entire duration of the activity. Furthermore, they enjoy working in groups and feel that working collaboratively helps them to learn.

Out of a total of 320 minutes of observation time, the equal high status group was off-task for only 17 minutes, a mere five percent. The equal low social status group was off task for 23 minutes, or seven percent of the time. The diverse social status group, on the other hand, was wholly or partly off task for a total of 57 out of the 320 minutes, nearly eighteen percent of the time. The equal social status groupings were off-task for approximately one-third the amount of time that the diverse social status group was off-task.

When interviewed regarding whether or not they liked working in their groups and if they thought working collaboratively helps them to learn, with the exception of one student, all students in equal social status groupings said that they liked working in their groups because they thought it was fun and it helped them to learn. One student said that he did not like working in groups because he "would rather just work alone." However, when asked if working with his group helped him to learn, he responded that it had because the people in his group explained parts of the task or process that he did not fully understand.

Generalization # 2

Based on the results of this study, members of equal status groupings frequently share ideas and thoughts with one another.

In the low-range social status group on March 29, 2007, Shaira attempts to explain to others how to approach the task of solving and recording the solution of a combining story problem. Others contribute by restating and evaluating what Shaira says. For example, Shaira says, "First you have to circle the numbers and some of the words in the problem." Timmy agrees, saying, "Yeah, that's first. Do that!" Della replies, "Okay, so I will circle these numbers first."

Within the high social status group, all members are observed positively exchanging and discussing ideas for tackling the problem. For example, when solving a separating story problem, Essence started a discussion with, "Okay, the first thing we should do is write the number at the top of the paper." Dani followed up with, "Right, and then we should draw, like, eighteen of something." Brittany then chimes in with, "I know! We can draw eighteen stick people." The group members continued to take turns speaking and using materials to complete their mathematical representation. This evidence is consistent for both of the equal social status groupings for each observation.

Generalization # 3

Based on the results of this study, members of equal status groupings participate more frequently in positive social interactions, listen more actively to other group members' ideas and respect and value other members' ideas. In these groups, responsibility and leadership are shared among all group members.

In my observations, I noted that students in equal status groupings often use nonverbal cues, like looking at the speaker and nodding the head, and verbal cues, utterances such as "uh-huh," or "yeah," to show that they are listening and reassure the group member who is speaking that what s/he is saying is important. Furthermore, students in equal status groupings demonstrate an appreciation of other members' contributions by saying things like, "Oh, I like that," "That's good," and "I like how you did that."

Generalization # 4

Based on the results of this study, the members of equal status groups appropriately share materials needed to complete the task by taking turns with them or finding ways for all members to be involved and using them at the same time.

With few exceptions, students appropriately took turns speaking and using the materials needed to complete the task. In equal status groupings, students worked together, but divided up responsibilities evenly. For example, a student in the equal high status grouping was observed saying, "First we're drawing eighteen stick people. I can draw the first six people, Dani can draw the next six people, and Brittany can draw the last six people."

During a later observation, students talked about how they would solve the problem by creating a representation that included a number line, number sentence,

and pictorial representation. Each member described how she thought she might go about completing her part. Once all members had shared and were at a consensus, then each student simultaneously used the materials provided to complete their portion of the task.

During one equal low status group observation, students divided up the task appropriately and divided up the paper with lines so that each group member had a task and a space to complete his/her portion of the work. This type of shared responsibility was consistent throughout the period of observation.

How does peer social status impact first graders' construction of mathematical concepts and social interactions in small learning groups when groups are composed of students with diverse social status?

Generalization # 5

Based on the results of this study, members of the diverse status groupings interact poorly at times and rarely share and transfer ideas between group members.

In the diverse status group, for example, on the April 23, 2007 observation, there is evidence that one member of the group did not participate and the finished product appears to represent the ideas of only one member of the group. This is an indication that the members of the group were not positively interacting socially. In other words, this group did not function as a cohesive whole.

On April 24, 2007, while all students contributed to the finished product, it is apparent that students were not sharing ideas and interacting with one another because the students used three different strategies and arrived at three different solutions, one of which was correct.

Generalization # 6

Based on the results of this study, members of the diverse status groups, particularly lower status members, are more often off-task during collaboration and tend to withdraw from the activity before it has been completed.

The diverse group was off-task nearly three times as much as either equal social status grouping. Furthermore, of the eight formal observations, the group member with the lowest social status withdrew four times from the activity before completing it. On two of the four occasions, the reason for the student's withdrawal from the activity was a feeling of frustration that he was being ignored and his ideas were not being accepted. On both occasions, he refused to work on the task, saying, "I'm not doing this anymore! They don't need me anyway!"

Generalization # 7

Based on the results from this study, lower social status members participating in diverse status groupings do not gain as much from the experience as mid-range or higher status members in the same group. Furthermore, lower social status members participating in diverse status groupings do not gain as much from the experience as lower social status members in equal status groups do.

Individual work completed before and after diverse group collaboration suggests that the lower social status student's development of the mathematical concept is minimal. For example, during one diverse group observation, the lower social status student withdrew from the activity about halfway through completion. Though he stayed seated at the table where his group members were working, he occupied himself by drawing pictures using the markers provided to complete the task and scrap paper he found on the floor. When other members of his group encouraged his participation, he responded negatively. Due to low levels of involvement in the

group process and a lack of positive social interaction with group members, the student does not gain as much from the experience as members of mid-range or high social status within the diverse group. Progress was not evident in this student's individual work completed after collaboration.

Similarly, based on individual assessment, it is apparent that the lower status member does not gain as much from the experience as lower social status members in equal status groups do. While the lower social status student in the diverse grouping demonstrates very little, if any, change in understanding of the mathematical concept, the lower social status student in the equal low social status group demonstrates significant concept development.

Generalization # 8

Based on the results of this study, equal status group members ask and receive help from their fellow group members more frequently than diverse status group members. Within diverse status groupings, if a lower-range social status member asks for help, s/he is often ignored.

In one instance, Katrina, a student of lower peer social status, was observed asking for help from her group members twice and was completely ignored both times. Ultimately, she loses focus and does not participate for the remainder of the activity.

During whole class observations during Investigations, when students worked in pairs composed of a lower-range social status member and a mid-range or high status member, the lower-status member often was not provided with appropriate help

or feedback when needed. In one instance, a lower status member voiced the she did not understand what the students were supposed to do. The mid-range status partner ignored the student at first, and as the lower status student become more frustrated, suggested that the lower status student watch what she was doing. This was not helpful to the lower status student at all. Ultimately, the lower status student approached the classroom teacher for help.

In another instance, the lower status member was working on her portion of the mathematical task. Her partner unkindly told her that she was "not doing it right!" Upon asking for assistance, however, her partner refused to help her and even told her to "ask someone else" for help.

Generalization # 9

In this study, within diverse status groups, the group member with the highest social status is usually observed assuming a role of leadership by delegating responsibilities, explaining concepts, and so forth.

During all observations of the diverse status grouping composed of Dani, Della, and Timmy, the highest social status member, Dani, divided up the task and delegated which member would complete which part. Generally, the higher status member took responsibility for the largest and/or most difficult portion of the task. When group members did not understand the task, she repeated directions and explained concepts. During these observations, Dani dominated the majority of the discussion, while Della and Timmy contributed little to conversations about the task.

Furthermore, Dani typically was observed telling the others how to complete the task rather than discussing the process and coming to a consensus.

Generalization # 10

Based on the data collected in this study, members of diverse status groupings typically have a great deal of difficulty sharing materials.

On numerous occasions, diverse status group members were observed arguing over materials and even, at times, having a tug-of-war over them. Furthermore, the diverse status group members typically could not agree on a way to work so that all members could use the materials simultaneously in a productive way.

Summary

Based on the findings expressed here relating to the research questions posed, it seems apparent that the types of groupings students are involved in have a significant affect on social interaction and achievement. When students are grouped with classmates of approximately equal social status, they interact more freely and positively and achieve a clear understanding of the mathematical concept or task. When students are members of a group composed of students with diverse social status, social interactions tend to be inhibited, especially for students of lower-range social status, and students do not gain as much from the experience as their peers in equal status groupings do. The findings in this study suggest the importance of considering peer social status when grouping students for activities in the classroom.

Chapter 5

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary and Conclusions

This study examined the impact of peer social status on first graders' social interactions and construction of mathematical concepts in small learning groups for mathematics. The study was conducted in a first grade general education classroom in an urban district in Western New York. Over the course of eight weeks, the researcher observed a focus group of eight students working in equal social status and diverse social status groupings. Social status was found to noticeably impact first graders' construction of mathematical concepts and social interactions. The findings expressed in Chapter 4 show that first graders' social interactions are more positive and the construction of mathematical concepts is more advanced when students participate in small learning groups consisting of students who have equal peer social status than when they participate in small learning groups with students with a peer social status that is higher or lower than their own. The following implications have been drawn from the findings reported in Chapter 4.

Implications and Recommendations

When teachers are aware of where the students in their classrooms are positioned socially, they become more aware of potential problems that may arise for some children as they work with others and identify ways to maximize equity within the

groups (Matthews and Kesner, 2003). Based upon the results of this study, the researcher recommends that teachers utilize a sociogram to determine each child's peer social status at the beginning, middle, and end of the school year. Doing so will help them to place students in groups and teams where all students are respected and appreciated. This study suggests that the most effective type of small learning group is one that is composed of students with approximately equal peer social status. Therefore, teachers should use the data collected from the sociogram to form equal social status groups composed of three to four students with equal, or nearly equal, peer social status. This is of importance because, as research has indicated, students experience higher levels of social and academic success when they are members of groups in which their ideas are accepted and respected (Cohen et al., 1999). Thus, carefully composing learning groups promotes increased positive social interactions, participation, and shared success among group members.

This research suggests that homogeneous groups, with regard to student social status, are most effective. However, because peer social status and ability seem to be closely associated to one another, grouping students by peer social status may result in groups that are homogenous with respect to student ability. Taking into consideration the wealth of current research indicating that ability grouping can hinder student success, it is undoubtedly beneficial, and necessary, to place students in heterogeneous learning groups for academic purposes, as well. To maximize student success, teachers should use both heterogeneous and homogeneous learning groups within the classroom.

This research study took place in one first grade classroom over a period of six weeks. To more fully understand the impact of peer social status on social interactions and the construction of mathematical concepts, additional questions to consider are:

- How does peer social status impact social interactions and construction of mathematical concepts at other grade levels?
- Can the impact of peer social status be altered by direct teaching of social and academic skills prior to group collaboration?

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Attachments

Attachment A

Sociogram

(adapted from Hubbard & Power's The Art of Classroom Inquiry, copyright 2003)

Introduction/Question:

"I'd like to ask you some questions about playing with others. I will not share what you tell me with anyone else. If you could play with anyone in the class at recess, whom would you play with?"

(Encourage the student to give you a first, second, and third choice by saying, "If s/he was absent, then who would you want to play with?")

Sociogram Analysis:

Stars: Students who had the most first choice nominations and had selection scores of 9 or above.

Mid-Range Status: Students with selection scores of 5 to 8.

Low-Range Status: Students with selection scores of 1 to 4.

Isolates: Students with a selection score of 0.

Attachment A

Sociogram Tally Sheet (Pseudonyms are used for student protection.)

Student Selections

	Della	Brittany	Timmy	Tori	Kyra	Shaira	Paul	Marcus	Shanel	Sky	Nelly	Essence	Dani	Tisha	Katrina	Juan
Della																
Brittany																
Timmy																
Tori																
Kyra																
Shaira																
Paul																
Marcus																
Shanel																
Sky																
Nelly																
Essence																
Dani																
Tisha																
Katrina																
Juan																

1 = child's first choice 2 = child's second choice 3 = child's third choice

1st choice = 3 points 2nd choice = 2 points 3rd choice = 1 point

Attachment B

Observation Checklist

Task: Students are solving a combining story. Group members are responsible for reading the combining story, writing a number sentence to describe the combination in the story, using manipulatives to represent the combination, and drawing a representation of the combination.

Group 1: Students With High Social Status

Date of Observation: March 28, 2007

Students are on task	√
Students are sharing ideas/ explaining concepts.	√
Students are listening to other members of their group.	√
Students encourage others to participate.	√
Students are showing respect for one another and one another's ideas.	√
Students are sharing materials used to complete the task.	√
Students are asking questions/ asking group members for help.	√

Comments:

This group is having a great day! All students are on task and productive.

Group 2: Students With Low-Range Social Status

Date of Observation: April 4, 2007

Students are on task	√
Students are sharing ideas/ explaining concepts.	√
Students are listening to other members of their group.	√
Students encourage others to participate.	√
Students are showing respect for one another and one another's ideas.	√
Students are sharing materials used to complete the task.	√
Students are asking questions/ asking group members for help.	

Comments:

Group members are interacting positively. Tiffany seems to be taking on a leadership role today, delegating responsibilities.

Attachment C

Assessment Checklist for Group Work

Date of Observation:
March 29, 2007

Group 1: Students With High Social Status

Students' response is incorrect and unreasonable.	
Students produced an incorrect but reasonable answer.	
Students produced a correct response.	√
Students' strategy is incoherent or unreasonable.	
Students use a reasonable and accurate strategy.	√
Students' product appears to represent all members of the group.	√
▪ All students have contributed to the written response in some way. Students have written their name next to their work.	√
Students' product appears to represent one member's ideas .	
▪ There is evidence that a member or members did not participate.	

Comments:

It is obvious that all members took an active part in the group's product. The group went above and beyond what was asked of them, providing multiple representations, number and word sentences, etc. Very well done.

Date of Observation:
April 5, 2007

Group 2: Students With Low-Range Social Status

Students' response is incorrect and unreasonable.	
Students produced an incorrect but reasonable answer.	√
Students produced a correct response.	
Students' strategy is incoherent or unreasonable.	
Students use a reasonable and accurate strategy.	√
Students' product appears to represent all members of the group.	√
▪ All students have contributed to the written response in some way. Students have written their name next to their work.	√
Students' product appears to represent one member's ideas .	
▪ There is evidence that a member or members did not participate.	

Comments:

There was a simple computational error on this product, but the strategy used is efficient. I find it important to note that the error is consistent in each of the tasks.

Assessment Checklist for Individual Work

Date of Assessment: _____

Group: _____

	Member 1:	Member 2:	Member 3:	Member 4:
Students' response is incorrect and impractical.				
Students produced an incorrect but reasonable answer.				
Students produced a correct response.				
Students' strategy is incoherent or impractical.				
Students use a reasonable and accurate strategy.				
Student's product appears to represent shared ideas from group work. (Example: Student's solution or product includes ideas shared by another person during group work. (See observation checklist and comments for record of student behavior in groups.)				
Students' product appears to represent only the individual's ideas. (Example: Student's work has shown little change or progress during and after group work. Student's solution resembles previous individual work.)				

Comments:

_____

_____

Attachment E

Dear Parent or Guardian,

As part of my research project for my master's program at SUNY College at Brockport this year, I will be looking at how small groups of students work within the classroom. Our students are often grouped together for activities in Investigations, our math program at School #25. I will be observing how students work together in small groups, student attitudes concerning small group activities, and most importantly, the impact on student learning and achievement in mathematics. In addition, I will be asking each student a set of questions regarding his/her peers. While all students will participate in the same activities, I will only collect data for those students with informed consent from both the student him/herself and the parent or guardian.

Each student will be given a pseudonym, or fictitious name, prior to the start of data collection. No child's name will be used when I collect data or share this information. To maintain confidentiality, all data collected will be kept in a locked filing cabinet.

You are being asked whether or not you agree to let your child participate in this study. Your child's participation is completely voluntary. There are no rewards or penalties for being or not being a part of the study. You are free to change your mind or stop your child's involvement in the study at any time during the study and there will be no penalty. If you agree to let your child participate in this study, please sign below in the space provided. Remember, you may change your mind at any point and your child will no longer be included in the study. Please return the bottom portion of this form to school with your child if you agree to let me use the results of your child's work in my research. I greatly appreciate your support.

My contact information, as well as my advisor's contact information, is included below if you would like to talk to me further about the study.

Sincerely,

Miss Stadelman
Nathaniel Hawthorne School #25
Phone: (585) 288-3654

Betsy Balzano
SUNY Brockport College
(585) 395-5549

--

I have read this letter and I agree to let my child's work be included in Miss Stadelman's research on small learning groups.

Parent/Guardian Signature _____ Date _____

Attachment F

Statement of Informed Consent for Students:

Student's name, you know that Mrs. Shaw and I often have you work in groups during math to solve problems or play games. For a project I am doing as a graduate student, I will be paying attention to how you and your group members work together, how you feel about working in your groups, and how those small groups help you to learn. In order for me to do this, I will need to take notes about what I see when you and your classmates are working in groups. Sometimes I will ask you some questions about how you like working in your group. I will also collect some of your work. Your names will not be used in my notes and your name will be removed from the work I collect. My notes will help me to understand how small groups help you to learn. You will not be penalized and I will not be mad at you if you do not want to be included in my study. Is it okay with you that I take notes while you work in groups and ask you some questions?

Miss Stadelman has my permission to take notes and tape record me while I work in groups.

Student Signature _____ Date _____

Considering Classroom Social Status When Grouping Students for Mathematical Investigations

1. **Overview and Purpose of Study:**

Purpose -

- The purpose of this research is to identify how peer status impacts first grade students' construction and social interactions of mathematical concepts in small learning groups of 4-5 members.
- It also seeks to identify specific types of groupings, with a focus on peer social status, that are most beneficial to students' learning. For example, what happens to students' construction of mathematical concepts when small groups consist of students of equal social status as determined by a sociogram? What happens when small learning groups are composed of students of diverse social status? What types of social interactions occur within the different types of groups?
- The data collected in this study will be used to inform my practice and increase my understanding of how students learn in small groups in mathematics.
- A sociogram will be conducted prior to data collection to determine each student's classroom social status. For my purposes, a sociogram is a tool that uses student interviews with each member of the class and requires for students to identify classmates with whom they would most like to play. Before questioning, students will be told that they will be asked some questions about playing with others. (Please refer to Attachment E). During the data collection phase, a checklist will be used during observations to record the types of social interactions that are taking place. A second checklist will be used to describe and assess individual student and group work in mathematics. I have designed these checklists according to my own needs and purposes. Please refer to Attachment B, Attachment C, and Attachment D.

Procedure - The steps in this study include the following:

- Following IRB approval, I will obtain parental informed consent by sending a letter home to parents explaining the research and asking for permission to use the results of their child's work in my research. Parents will be assured that confidentiality will be maintained, as pseudonyms will be assigned to each child prior to the commencement of the research. In addition, all data collected will be kept in a locked filing cabinet to ensure confidentiality.
- I will then obtain informed consent from each student by explaining to the student what types of data I will be collecting and asking for their permission to use the records I take on them in my research. After consent is obtained, I will identify the classroom social status of each student using a sociogram. Pseudonyms will be given to each individual and no information about social status based on the sociogram analysis will be shared with students.

- After the results of the sociograms are compiled and analyzed, I will arrange students into categories based upon social status. These groups are: high social status stars, with a peer selection score of 9 or above; mid-range social status students, with a peer selection score between 5 and 8; low-range social status students, with a peer selection score between 1 and 4; and social isolates, with a peer selection score of 0. From these groups, the researcher will arrange students into the following four groups of 4-5 students: students with equal high social status, students with equal mid-range social status, students with diverse social status group A, and students with diverse social status group B. The groups will change midway through data collection to include a group of equal low-range social status students. While all students will participate in the small groups for mathematics, data will only be collected on students for whom consent has been granted.
- I will observe students working in their groups and occasionally participate in the group process, while focusing on the nature and quality of each individual's social interaction and participation in each of the different groups. While observing, the researcher will use an observation checklist and note paper to record observations. (Please refer to attachment B). The researcher will collect all student work produced during small group collaborations as well as independent math work. Individual and group work will be assessed based on the strategies used, accuracy, and appearance of shared ideas between group members. (See attachments C and D). At the end of each unit, the researcher will randomly select one student from each group by drawing a name out of a bag, to interview. The interview will include questions concerning how and why the student did or did not like working in their groups that week. Once a student is interviewed, his/her name is not returned to the bag until each of the other group members is interviewed.

2. **Number and relevant characteristics of subjects:**
Research will be conducted at Nathaniel Hawthorne School #25 in Rochester, New York. It will take place in a first-grade classroom where I am currently completing an internship. There are seventeen students in the classroom. While all students will participate in small groups during the mathematics program, data will be collected on all students for whom consent has been granted.

3. **Describe how subjects will be selected for participation:**
All students will participate in the small group activities for mathematics. However, data will only be collected on students for whom consent has been granted. No fees, gifts, extra credit, or other incentives will be awarded for participation.

4. **Status and qualifications of the research assistants:**
No research assistants will be involved in the study.

5. **Source of funding:**
No funding has been awarded for this research study.

6. **Expected starting and completion dates:**
Data collection will begin upon IRB approval and continue through April, 2007. Data analysis will continue through August of 2007.

7. **Attach copies of all questionnaires, testing instruments, or interview protocols, and any cover letters or instructions to participants.**
The following are attached:

I. Sociogram questions and outline.
II. Interview questions to be asked at the end of each mathematical concept.
III. Checklist for observing student groups.
IV. Checklist for describing and analyzing individual work.
V. Checklist for describing and analyzing group work.

8. **Online training course:**
I have completed the online training course. A copy of the certificate of completion has been attached.

9. Specify steps to be taken to guard the confidentiality of participants' responses:

- Students will be provided with pseudonyms prior to data collection.
- Student names will be removed from any student work that is collected.
- All data, including checklists, notes, and interview logs will be stored in a locked filing cabinet in my home.
- All written data will be shredded and audiotapes erased upon submission of my graduate thesis.

10. **Attach informed consent documents:**
The following are attached:

- Guardian informed consent form
- Student informed consent form

11. **Institutional Approval**
See attached letter from Rick Smith, principal, Nathaniel Hawthorne School #25.

12. Students will not come into contact with mechanical, electrical, electronic or other equipment.